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TRAFFIC MANAGEMENT

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INTRODUCTION

India is a developing country where personal vehicles are increasing day by day. With the expansion of transportation, the country continuously grows in different economic and social dimensions. It is essential to consider a better traffic management system, due to the rise in congestion of roads in large cities. The main purpose of the project is to define a better traffic management system to increase the efficiency of transportation in India. Manual control of traffic is considered an effective solution for the problem (Aleko and Djahel, 2020). However, an adaptive and automated traffic management system seems to be a better choice to deal with the traffic problems in India.

India is the world's biggest democratic republic. It has a population of 1.3 billion inhabitants and a geographical area of 3.1 million square kilometers. India's population and urbanization grow, so does the demand of usage for vehicles, putting a strain on the current traffic management system. One of the most crucial matters for smart cities is to implement more environmentally friendly and sustainable alternatives to alleviate traffic congestion and levels of pollution. Moreover, the rise in the magnitude and frequency of commercial vehicle load capacity has placed an undue strain on operating road networks that leads to traffic blocking. All traffic control metrics are presently controlled manually and thus does not aid the vehicle in real time (Sahay et al., 2019).

The phenomenon of continuous migration to major metropolitan areas of India such as New Delhi, Mumbai, Bangalore, Hyderabad, Ahmadabad, etc. is

Improving the system of traffic management at crossings

- the traffic quality level is the basis for selecting a traffic situation management strategy;
- common methods for assessing the traffic quality level are based on the planning context;
- a variety of assessment methods repeat each other in many aspects;
- existing recommendations for assessing the traffic quality level are theoretical.
- in practice, the existing assessment methods serve as a benchmark, are not applicable in all cases and require many independent decisions based on the experience;
- in addition to traffic frequency, additional external factors affect the traffic;
- there is a relationship between the quality assessment criteria used to assess traffic and used factors;
- the main aspects for assessing the traffic flow are the assessment of the traffic flow during a day, assessment of the period of interest for several days and traffic behavior being exposed to the external factors. External factors shall be understood, for example, weather events (rain, snowfall, ice, light dazzling, etc.), the environment (development and arrangement of the space adjacent to the roadway);
- there are several levels of traffic assessment, strictly speaking, in the same manner as activities planning: strategic, planned and operational.

Problems in Traffic Systems

The effective mobility of people and goods through physical highways and main road network systems is an intriguing problem in a transportation system. A multitude of characteristics distinguishes transportation systems, making them difficult to analyze, regulate, and improve. The systems generally encompass multiple physical regions, have a big proportion of people participating, the participants' aims and objectives are not always aligned with one another or that of the network operator (i.e., system optimum vs. user optimum), and there are several system primary inputs that are beyond the operator's and participants' control (e.g., the weather conditions, the number of users, etc.). Furthermore, road and street mass transit systems are generally complex and dynamic in nature, meaning that the percentage of components in the system fluctuates with time and with a high degree of unpredictability. The number of cars traversing large cities is also rapidly increasing at the present time. This upsurge, which can be attributed to population expansion including the use of automobiles as a mode of transportation, causes plenty of issues in the transportation system. Because there are so many active participants in the system at the moment, there are a lot of interactions going along at the same time. There are several other things that

Advanced Traffic Management System - ATMS

Advanced Traffic Management system is an integrated solution to manage highway traffic through real time information collection, processing, analysis and finally dissemination to the users, concerned agencies and stake holders. To ensure round the clock safety, it is of prime importance to provide real time and precise information to users about the road condition, traffic situations, incidents and weather conditions on the highway. It is also important to make interventions for smooth, safe and efficient traffic movement by providing rescue and relief to the users to avoid distress.

'nexGen" ATMS Solution from Arya Omnitalk ensures that our customers have the best solutions they need for the future to manage traffic flow intelligently, effectively and meeting with ever-changing operating environment. Custom-integrated Advanced Traffic Management System solutions is an efficient and cost-effective solution designed, engineered, built and integrated with a balance of customized components and commercially off-the-shelf-products for customer. A highway traffic management system (HTMS)/advanced traffic management system (ATMS) involves a set of intelligently integrated roadside equipment that are connected to ensure a safe and secure journey, including smooth traffic movement and timely reaction to untoward incidents.

ANALYSIS OF THE TRAFFIC MANAGEMENT SYSTEM IN URBAN NETWORKS

... ...K, OPTIMIZATION

Starting from the second half of the eighties a number of dynamic systems that calculate the parameters of a transport node (a cycle or composition of phases of traffic lights based on actual changing traffic conditions) is developed. However, the quality of dynamic management, as we know, determined by the quality of the model traffic flow. There are also limitations, due to the fact that the developed model is usually not prepared for extreme changes of the condition of a traffic flow. Nevertheless, the issue of dynamic control of the node or node group is not simple considering that on a simple crossroads may be 12 directions of movement of vehicles, i.e. for a simple network formed by ten nodes, we are talking about 120 directions. The output of the regulatory process should be to minimize delay to 120 destinations, and the traffic intensity varies in time and space [1], [3].

Development of mathematical dynamic models of calculation of parameters of a transport hub will create well-functioning of traffic control system. These systems will allow to adjust traffic flows in built-up areas and in undeveloped suburban areas, thereby will allow to use the full potential of the existing route network, as well as significantly reducing the influence of the number and consequences of road accidents on the functioning of the transport system of the city.

Traffic control device used to manage the transport network in the city. Usually it is equipped with sensors to monitor the presence of vehicles or pedestrians. The executive elements are the signal lights (traffic lights), CCTV cameras, GPS sensors, which provide information to the driver or pedestrians. The control device can work in isolation without communication with other control devices or with a central station that can be installed in a coordinated line or may be managed by the control center. From the management point of view, there are two basic states: managing the transport node and the transport network (area) [2].

The aim of this publication is the analysis of the traffic management systems. Modern systems of traffic management can be divided into static and dynamic (traffic-dependent). For control systems of the traffic flows the big interest has transport-dependent control device. In case of transport-dependent control available detectors before the stop lines that capture the instantaneous presence of vehicles, and control device thus responds to the instantaneous conditions in the node, for example, increasing the duration of the green signal. These changes are transmitted to the Central management node, which makes subsequent adjustments to the device nodes of the road.

Therefore, we are talking about traffic management in the transport nodes in the used grid time (which is line management), and also all traffic.

Consequently, the biggest interest have the systems which are working in real traffic conditions.

Consider existing systems of traffic control [1], [2].

The modern system of traffic control management is equipped with a control device characterized by control devices (nodes). They are controlled: 1 - on a fixed schedule; 2 - on a state of a transport stream (transport-dependent).

Traffic management in transport nodes is divided in the following categories:

• time-dependent control – transport status is determined on the basis of statistical analysis of historical values of the characteristics of traffic flow (traffic intensity) and on the basis determined by the output values of the regulatory process;

• transport-dependent control (in real time) – management, the intervention of which is calculated on instantaneous traffic situation. Methods of real time (online) provide work in real-time, every second make changes and optimize the control parameters, i.e. duration of the green signal in the corresponding direction.

Traffic light control in real time is well known and is used as a standard under the name transport-dependent control or dynamic control. Its principle is that the node is usually equipped with two types of sensors: sensors intervals and call that are in most cases inductive loop. The transport device control program that continuously tests the state of the traffic flow over separate sensors and on the basis of pre-defined algorithms increases the duration of signals, modifies the phase sequence or phase invests on call. These changes are usually carried out within a predetermined time cycle and predetermined maximum values, the duration of green signals.

Sensor intervals, located approximately 30-50 m before the stop line, got its name due to the fact that it continuously measures the time intervals between vehicles and if they are less than a given value (usually 3-5 seconds), it increases the duration of green signals up to a predetermined maximum. Such a measurement method called "Management by measurement of time interval". In addition, the duration of green signals may also be increased on the basis of the measurement conditions of the sensor, which essentially represents the relative time during which the sensor is located above the vehicle, and based on this value, expressed as a percentage, extends or shortens the duration of the green signal. Sensor call is located before the stop line or in more remote locations, where can irregularly be formed congestion. In both cases, depending on the control algorithms embedded phase, is identified if the employment of a sensor of the vehicle.

Certainly, it is possible multiple grouping controls in a line and method of management in the system, also called "green wave". Methods of calculation are well known and come from the calculation of the coordination parameter, which is the time shift.

being observed. It has resulted in an increase in the total count of urban populations. Mobility requests are outstripping infrastructure potential in this urban environment, resulting in greater traffic congestion. The spread of existing road infrastructure is a feasible alternative, but it is not always possible due to land-use prohibitions and budget constraints. An effective use of current infrastructure through the implementation of dynamic and intelligent control methods, which are flexible to current traffic conditions, is an alternative to the urban traffic congestion problem. Such traffic control techniques will intend to maximize the throughput of the urban traffic network by reducing traffic congestion obstacles, which are frequently found at network crossings (Borg and Scerri, 2015). This research study will help devise the measures to minimize the strain offered by an increased number of transportation entities and limiting the waiting time that will ensure an effective traffic system of India.

The main problem which should be faced by the India's traffic system is many of the roads are un-surfaced which causes many traffic problems and they are not suitable for the use of vehicular traffic in a significant manner. Due to poor quality of roads in India there were to the wear and tear of vehicles even on many National Highways since the quality of roads was very poor. Therefore, it creates the biggest challenge that must require solutions to promote appropriate activity.

In addition to this, one of the major problems which can be faced by the India's traffic system is mixing traffic. The single road should be used by the cars

• Conclusion:

In software implementations, should choose clear and understandable the solutions.

Design a traffic light using the state machine is very difficult compare to design using the logic gates.

Verilog HDL (Hardware Description Language) text editor was chosen to write a program code for simulation only to get a timing diagram. This is because it easy to write and understand compare to other language.